DOCUMENT RESUME

ED 345 711 IR 015 544

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TITLE Audiographics for Distance Education: An Alternative Technology.
PUB DATE Mar 90
NOTE 6p.; Paper presented at the Annual Conference of the Alaska Association for Computers in Education (March 1990).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cost Effectiveness; Delivery Systems; *Distance Education; Educational Research; Higher Education; *Instructional Effectiveness; Interaction; Microcomputers; Secondary Education; *Student Attitudes; *Student Motivation; Teleconferencing; Telephone Communications Systems
IDENTIFIERS *Audiographics

ABSTRACT

Audiographics is the merging of microcomputer graphics, telephone communications systems, and teaching strategies into a cost effective method of delivering distance education classes. The teacher creates visual images that are sent to and stored on computers at the remote sites. At the appropriate time the teacher and the remote site assistants connect all of the sites via telephone lines, an audio-bridge, and modem, enabling the teacher and the students at all of the sites to interact with each other as they could in a traditional classroom. Video interaction occurs through the computers and audio interaction through speaker phones. The cost of each site is between $3,000 and $8,500, depending on the equipment chosen. This compares favorably with costs for communication satellites ($15,000 to $25,000), or for hiring teachers to teach at each site. Research has shown that the motivational levels, attitude levels, and the quality of the learning experience were all positively affected by audiographics for both high school and college students. It is argued that audiographics is the most cost-effective, efficient, and motivation-enhancing distance education system currently available; it can be used in rural and urban schools to reduce overall operating costs by combining small classes at different schools, to increase course offerings, and to reduce time for commuting teachers; and it can even be used with home-bound students, prison inmates, and "special case" non-attending students. (10 references) (DB)

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Paper Presented at the Alaska Association for Computers in Education Conference, March 1990.

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Audiographics for Distance Education:

An Alternative Technology

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Distance Education is changing rapidly. The old correspondence courses are still around and have some viable uses. You are, however, more likely to see distance education being conducted over satellite networks, television signals, and telephone lines than through the mail.

One of the majors problem with distance learning today is the cost - distance education technology is expensive. One approach to distance education technology, however, is somewhat less expensive than the other technologies -- AUDIOGRAPHICS. Audiographics is the most cost-effective of all of the distance learning systems and has been proven to be an effective delivery system (Fredrickson, 1989; Ellerson, 1987; Haaland & Newby, 1984; Galvin, 1987; Maher, 1986).

Audiographics is the merging of computer graphics, telephone lines, and teaching strategies into a cost-effective method of conducting distance education classes. The teacher creates visual images, called "slides" or "pages" which are then sent to and stored on the fixed disks of the computers at the remote sites. At the appropriate time the teacher and the remote site assistants connect all of the sites together using telephone lines, an audio-bridge, and modem. An audio-bridge makes all of the telephone lines similar to one big party-line. The teacher and the students at all of the remote sites are able to interact with each other, just as they could in a traditional classroom. The video interaction is via the computer system and the voice transmission is via speakerphones. When the teacher wishes to show an example or clarify a point, a "slide" can be called up (displayed) on all of the monitors at once, in the same way that a traditional teacher can use a chalkboard or overhead projector. The teacher can turn the control of the system over to a student in order for the student to draw on the screen or display a slide when asking a question or demonstrating his or her knowledge.

The various audiographic systems, which are produced by several manufacturers, generally have similar components. Basic components for each site include the following:

1 or more IBM PC/XT/AT (or compatible) with:
    256 to 512 KB (depends upon software)
    20 to 30 MB Fixed Disk
    CGA\EGA\VGA monitor
1200 or 2400 baud modem
optional - light pen or digitized tablet;
1 speakerphone;
2 telephone lines;
audiographics software package;
for any site that will have many students and only one computer, a large screen

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projection device capable of displaying the contents of the computer screen on a wall screen is recommended.

The cost of each site with the above equipment (excluding the projector) is between $3,000 and $8,500. Compared to an interactive satellite delivery systems for distance education, this is markedly less expensive. The initial equipment cost for current satellite delivery systems range between $15,000 to $25,000 and have annual subscription fees of $4,000 to $10,000. Since the equipment that is needed for audiographics is purchased, there are no reoccurring equipment costs, except for telephone line rates. To establish an audiographics lab costs significantly less than the cost to establish a lab for the other distance education systems. Ellerson (1987) studied 21 audio-graphically conducted courses with a total of 479 high school students. The cost was much less than the cost for similar courses using the other technologies. Azamsa (1987) noted similar savings in his study. Hunro (1986) studied rural community college students. He concluded that the "advantages (of audiographics) include ... cost-effectiveness, reliability, and flexibility" (p. 5).

In addition to the initial costs being less for audiographics, several districts can share some related continuing costs. Assume that one school has three students that want and/or need to take Calculus. At the same time, another school that is 140 miles away has six students that need that course also. Perhaps, even a third school has a similar problem with seven students. It is not likely that all three schools can hire teachers to teach only a few students. However, the three schools can equip their local site or sites, hire one teacher to teach the students and split the cost of the teacher's salary three ways. This same concept would apply if the schools wanted to offer advanced French, Computer Science II, or any of the other subjects that normally are too expensive for small districts.

The RGB projector can be used to reduce costs also. Since the students must be able to see the computer monitor during the class, there is a limit to the number of students that can sit around one computer and see the monitor. Each site might have several computers to allow larger classes. The projector and the necessary associated hardware will cost in the neighborhood of $4,500 to $6,000. Hence, one projector would cost less than three or more computers. For a particular school district, it might make sense economically to purchase only one computer and the projector for its larger classes.

Since audiographics is a cost-effective delivery system, the taxpayers and the school board should be happy with it. That raises the question as to whether the teachers and students will be happy also. If happiness for teachers and students can be defined by improved scores, higher qualitative and quantitative student learning, and improved motivation the answer is certainly affirmative. Maher (1986) examined several studies of high school and college students. He observed that 94% of his students learned, what he classified "a great deal" and 94% would also take another audiographics course.

Galvin (1987) examined audiographic use with 40 students in three subject areas and an electronic field trip. He found that "these programs were all remarkably successful and concluded ... with the enthusiastic support of participating students, teachers, and administrators" (p. 47). The innovative use of audiographics as an electronic field trip is merely one of a number

of ways to use this distance educational tool.

Leach (1986) found that high school students learned to rely on themselves more than when they were in a traditional setting. Ellerson (1987), in addition to the cost-effectiveness noted above, also found that audiographic students scored as well or better than traditional students did in a variety of classes. Haile and Richards (1983) studied two behavioral science college courses with students that ranged from 20 to 52 years of age. They found that 72.7% of the students in their study agreed that student motivation levels improved and a similar percentage "learned a lot."

Azamsa (1987) noted that student motivational levels, attitude levels, and the quality of the experience were all positively affected by audio-graphics. Batey and Cowell (1986) developed an audiographics course in which a college level course was taught to high school students. The high school students met once a week for a 45 minute class period. In addition, they met once per week for a 25 minute "office hour" session. Batey and Cowell also taught the same course in a tradition setting to college students that met for three hours per week. The median scores for mid-term and final examinations were compared. The high school students who had less than one-half of the amount of class time that the college students had, scored just "slightly below" the older, more academically-advanced college students. Had audiographics not been effective, the high school students would have scored substantially lower than the college students.

Several studies have shown that students in an audiographics course do not wish to be seen as "unprepared" for class. Since there is a very high degree of interaction between the teacher and the students and among the students themselves, it is very noticeable when a student has not read the assignment or finished the homework. Students also must listen to the speakerphones in order to hear the teacher or the other students and hence they pay more attention to the class content than do students in a traditional classroom. They pay more attention to the screen than they do to a regular chalkboard and interact more with their teacher and peers in an audiographics class than they do in a regular class. In addition, with having information presented visually on the monitor and discussed verbally, several different learning styles are called into play during the course of each lesson, which should allow a more thorough comprehension of the subject matter to develop. A more thorough understanding of the subject matter should enable a student to score better on standardized tests, college entrance exams, and Advanced Placement exams.

A side benefit with audiographics is that travel time for the teacher or professor is reduced. Assume that the teacher must travel to four distance sites every week to conduct the same course. If all four sites were connected via audiographics, the teacher would only have to teach that course once a week. The teacher could travel to one of the sites and conduct the class from there for the first week. The next week the teacher could travel to the second site and teach all four classes from there. Every week, the teacher could go to a different site, thereby involving all of the students and all of the sites. The teacher would use only one-fourth of the travel time that would be required in a non-audiographics environment.

Audiographics is the most cost-effective, efficient, and motivation-enhancing distance education system currently available. It can be used in rural and urban schools to reduce overall operating

costs by combining small classes at different schools, to increase course offerings, and to reduce transportation time for commuting teachers. It can even be used with home-bound students, prison inmates, and "special case," non-attending students. If a school system is looking for a method that will improve student motivation, classroom performance, and scores without increasing costs dramatically, that school system is looking for audiographics.

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